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REARING EULEUCOPHAEUS RUBRIDORSA AND E. LEX (SATURNIIDAE)

BRIAN O. C. GARDINER

18 Chesterton Hall Crescent, Cambridge, England.

INTRODUCTION

FINAL AND PENULTIMATE INSTAR LARVAE of *Euleucophaeus rubridorsa* Felder and *E. lex* Druce were collected in the vicinity of the Great Pyramid, Teotihuacan, near Mexico City about the middle of September 1961 by Dr. A. D. Blest and Dr. T. S. Collett who kept them in plastic boxes and delivered them to me in England on 26. IX. 61. Upon receipt the larvae, which were as yet unidentified, were sorted into two species and reared separately.

When the larvae arrived both were feeding on rather dried leaves of some species of Leguminosae which it was not possible to identify, but from the leaf form and bits of stem appeared to be a kind of prickly Mimosa. This was the plant from which the wild larvae had been collected. They were offered various European trees and shrubs and the rearing was carried out at 20-25°C. under natural conditions of British daylight.

EULEUCOPHAEUS LEX

On receipt the larvae were offered *Robinia pseudo-acacia* to which they transferred after a few days. As the leaves of this tree shortly began to fall *Fagus sylvatica* was later offered and this too was accepted by all the larvae.

The larvae were very slow in their movements and showed no sign of being gregarious. When disturbed there was a tendency for them to drop and curl up on the ground although this reaction is by no means so intense as I have observed in, for instance, *Automeris vinosus* Conte, and is about equal to the intensity in the final instar larvae of the rather better known *Hemileuca maia* Druce.

About 80 larvae were received. Of these 25 per cent died for unknown reasons and a further 25 per cent produced parasites of the genus *Apanteles*. It has not to date been possible to determine the exact species). From 12-24 specimens of *Apanteles* emerged through the skin of each *lex* larva. They then proceeded to spin their oval white cocoons amongst the spines of the larva. The adult parasites emerged about a week after pupation. It is interesting to speculate what they then do in nature. The first adult parasites appeared only 16 days after receipt of the larvae and there seems no doubt that they would be emerging simultaneously in Mexico. What then does the next generation live on? The *lex* larvae are now all final instar. Do the *Apanteles* (which normally parasites the early instars of Lepidopterous larvae) have an alternative host? Here is an opportunity for some field research in Mexico.

Even more curious is the failure of the *Apanteles* to kill the *lex* larvae immediately. Although a few remained motionless after the parasites had emerged, most of them continued to walk slowly about, without feeding, for up to 14 days before dying. The adult parasites were thus emerging before the death of their host.

The remaining 50 per cent of the larvae successfully pupated. Pupation took place in a flimsy cocoon, generally in the corners of the rearing cage, a few amongst the leaves of the foodplant, where it would probably normally occur in nature. The pupa itself is a bluish-black color and it and the cocoon case is covered with a white powder. A similar powder occurs in certain Lasio-campidae but in no other Saturniid genus known to me.

The full-grown larva is cylindrical, about 4-4.5 cms. long. Head black. Dorsally velvety-black, densely covered with reddish-brown and golden-yellow slightly raised minute dots many of which bear a short white hair. The colors of these dots are so arranged as to give the effect of a yellowish lateral line, above which is orange, then yellow again and finally an orange dorsal line. The chalazae are short, black, bearing dense spines which are black at the base with white tips. Spiracles inconspicuous. Ventrally, the ground color black, covered in grey slightly raised spots each bearing a whitish hair. Legs similarly marked.

The duration of the final instar was 34 days and of the pupal stage (based on 4 individuals only — the rest of the pupae having been used for other purposes) — 60 days. The moths were noted to be diurnal flyers.

EULEUCOPHAEUS RUBRIDORSA

On receipt the larvae were offered *F. sylvatica* which was at once accepted. *R. pseudo-acacia* was also found to be eaten.

The final instar larvae are rather more active than those of *lex*, show the same tendency to drop when disturbed and also spin a flimsy cocoon in the corners of their cage or among the leaves of their foodplant. Similar in color and appearance; also covered with whitish powder.

Only a few of the larvae died and although none produced any *Apanteles* parasites, three of them produced a dipterous parasite each. These were a single female *Spoggosia* (*Spoggosia*) *floridensis* (Tns.) and two male *Leschenaultia* sp. near *leuco-phrys* (Wied.) and *fusca* Tns. These are the first records of Tachinidae from this host.

The full-grown larva is cylindrical, about 4-4.5 cms. long. Head black with fine, sparse, whitish hair. Ground color dark grey, covered in lighter grey or silver round and oblong slightly raised, very small and numerous spots which, laterally and ventrally bear whitish hairs. These are so clustered as to form a distinct lateral lightish silver-grey line. The chalazae very short and with very dense spines, these being whitish-grey at base with black tips. The legs black with whitish-grey spots and whitish hairs.

As with *lex*, most of the pupae were used for other purposes and only a few moths emerged. The first female to do so did not expand her wings until 18 hours after eclosion. This is the only instance known to me of such a long delay, It being my experience that unless wing expansion occurs within minutes of eclosion then it does not take place at all. This case was obviously exceptional and no other instance of it occurred either with this species, with *lex*, or amongst the many specimens of the closely related *Hemileuca* spp. that I have bred.

The moths are diurnal, and shortly after this female had expanded her wings she commenced to "call" and was paired in the afternoon in bright winter sunlight. Copulation lasted between 30 and 45 minutes. She commenced to oviposit just after dusk and laid 158 ova in two batches. She was very active the following day but died that night without laying any more. She was found to be empty of ova. Another virgin that was dissected was found to contain 155 ova. The ova are large for the size of the moth. When first laid they are jet black, but within 1-2 minutes fade to the brown color of milk chocolate, with a black micropyle. They were laid in a regular mass on the side of the

cage containing the female. In nature probably in a ring round twigs like *H. maia* does. The eggs were kept at $15^{\circ}\text{C.} \pm 5^{\circ}\text{C.}$ and hatched in 59 days.

The newly hatched larvae were transferred to 25°C. and offered a choice of *Salix* sp. (which had been forced in a heated greenhouse) and various Graminae. After 48 hours they commenced to feed on the *Salix*, but two days later they at once transferred to *Mimosa dealbata* when this was offered them. At this stage, and for the next few instars, they are strongly gregarious and move in single file columns. When feeding they form a tight cluster and feed gradually outwards from the base of the leaves towards the tip. When they reached the fifth instar the *M. dealbata* gave out and *Quercus ilex* was offered and accepted. Unfortunately after the 7th moult the majority of the larvae died of what appears to have been a granulosis virus disease, although absolute confirmation of this has not yet been possible.

The fact that this disease occurred in a subsequent generation, and at such a great distance from any natural specific source, is strong evidence that this was a trans-ovarially transmitted disease.

The duration of the various stages can be summarized as follows:—

Egg stage at $15^{\circ}\text{C.} \pm 5^{\circ}\text{C.}$	= 59 days
1st instar larva at 25°C.	= 10 "
2nd " " " $20^{\circ}-25^{\circ}\text{C.}$	= 11 "
3rd " " " "	= 7 "
4th " " " "	= 12 "
5th " " " "	= 18 "
6th " " " "	= 11 "
7th " " " "	= 15 "
8th " " " "	= 30 "
Pupal stage " "	= 42 "

which gives a total of 215 days or seven months.

DISCUSSION

It has been possible to rear one species, *rubridorsa*, right through from egg to adult for the first time. The complete life-cycle period of seven months is an odd one and unlikely to be found in nature where the species is either double-brooded with a six-month cycle, or, perhaps rather more likely, at some stage or other diapauses, probably in the egg stage like *H. maia*. My eggs were kept comparatively warm at $15^{\circ}\text{C.} \pm 5^{\circ}$ and I have known

maia eggs, when also kept warm hatch within two months instead of overwintering.

The number of larval instars is eight, which is high for a Saturniid, many species of which have but 5 or 6 instars. Combined with this is the very long larval period of 114 days, which is nearly double that of *Hylesia nigricans* Berg, the only other Saturniid I am acquainted with which also has eight instars, and which when reared under comparable conditions, has a larval period of 64 days. The very slow and lethargic movements, combined with several days spent in moulting, supports the belief that this figure is a true one, probably corresponds to that found in Mexico, and is not attributable to the unfamiliar food that was being eaten.

With the other species, *lex*, it was not possible to determine the complete life-cycle. Nevertheless, some useful information was obtained, the duration of the final instar and pupal stages being determined and also that this is a diurnal moth. In Mexico there seems little doubt that the two species are nearly contemporaneous.

Like all Hemileucine larvae the spines can give a painful sting when brushed against. The effect of both these species is similar, and not very painful, at any rate to the author!

Very little appears to be known about the early stages or life-histories of the genus *Euleucophaeus* and several inaccurate and vague statements have been made about it. According to Michener (1952) most of the species are Mexican with a few ranging north to Arizona and Kansas. A study of the distribution of the various species given by Draudt (1930) confirms this. Crotch (1956) states, incorrectly, that they are all South American.

Draudt (1930) also states that "all of them (the larvae) probably live on grass". Crotch (1956) that "the larvae are thought all to be grass-feeders". However, the only species that have actually been found feeding on grass are *mania* Druce and *oliviae* Cockerell (Draudt, 1930). Both *lex* and *rubridorsa* have to spin their oval white cocoons among the spines of the larva. now been found in the wild feeding on a tree or shrub which, although exact determination was not possible, was clearly of the family Leguminosae and the larvae were found subsequently to feed on other members of this family, *Robinia* and *Mimosa* as well as various Fagaceae. (It is my experience of Saturniids that all species perhaps normally found on Leguminosae in the tropics will accept temperate zone Fagaceae).

The dipterous parasites were too few to give any indication of specificity, but is perhaps significant that only *lex* had been parasitised by an *Apanteles* species, since the two species were occurring together at the same stage. Nevertheless, as already surmised, it seems that the *Apanteles* must have an alternative host.

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